

Effectiveness of Diaphragmatic Manipulation along with conventional Physiotherapy for patients with chronic obstructive pulmonary disease (COPD).

Authors:

Md. Rofiqul Islam¹, Ehsanur Rahman^{2*}, Md. Obaidul Haque³,

Mohammad Habibur Rahman⁴, Md. Shehabul Islam Mazumder⁵, Md. Zahid Hossain⁶

¹In charge & Senior Physiotherapist, Ibne Sina Specialized Hospital, Dhaka, Bangladesh.

²Assistant Professor, Department of Physiotherapy, BHPI, CRP, Dhaka, Bangladesh.

³Professor & Vice Principal, BHPI, CRP, Dhaka, Bangladesh.

⁴Lecturer of Physiotherapy, School of Science and Technology, Bangladesh Open University, Gazipur-1705.

⁵Resident Physiotherapist, University of Toronto, Canada.

⁶Lecturer, Department of Physiotherapy, BHPI, CRP, Dhaka, Bangladesh

*Corresponding Author:

Ehsanur Rahman

* Assistant Professor, Department of physiotherapy, BHPI, CRP, Dhaka, Bangladesh

E-mail: ehsanurrahman09@gmail.com

Abstract:

Introduction: Many manual procedures have long been involved in the management of chronic obstructive pulmonary disease (COPD). Few literatures evaluated the COPD responses to individual or multiple manipulative techniques, so effects are unclear and poorly understood.

Objective: To determine the effectiveness of diaphragmatic manipulation along with conventional physiotherapy on respiratory parameters for patients with chronic obstructive pulmonary disease.

Methodology: 30 participants (age range: 40 to 70 years) from National Institute of Diseases of Chest and Hospital (NIDCH) from Mohakhali, Dhaka with chronic obstructive pulmonary diseases (COPD) were included in the study. Diaphragmatic manipulation was applied to experimental group. The conventional treatment was given for 6 sessions/two week including 3 repetitions in one session in 3 session a day of no less than 30 minutes duration for consecutive 2 weeks. Experimental research design measured by using mean, standard deviation, paired t test, independent –t test was taken.

Result: Significant difference between Pre and Post values of all components of respiratory assessment questionnaires showing the effectiveness of diaphragmatic manipulation in reducing pulse rate and improving pulse rate and oxygen saturation rate in 6-minute walk test. Moreover within group comparison in experimental and control group it was found that all the respiratory parameters were significant through diaphragmatic manipulation along with conventional physiotherapy and conventional physiotherapy but only oxygen saturation rate in control group it was not significant. Conclusion: Diaphragmatic manipulation along with conventional physiotherapy yields statistically as well as clinically significant improvements in both pulse rate and six minute walk test in patient with COPD between the ages of 40 and 70 years.

Keywords: Diaphragmatic manipulation, Chronic Obstructive Pulmonary Disease.

1. Introduction: Chronic obstructive pulmonary disease (COPD) is a lung disease characterized by chronic obstruction of lung airflow that interferes with normal breathing and is not fully reversible¹. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) defined Chronic Obstructive Pulmonary Disease (COPD) as airflow limitation that tends to not be fully reversible and which is usually both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases⁶.

COPD burden is born by 11 Asian countries and Asian Pacific Society of Respiratory Diseases 6.2% of the global. In Nepal, COPD accounts for 43% of the non-communicable disease burden, and 2.56% of hospitalizations. Tobacco smoking is the primary cause of COPD, indoor air pollution from biomass and/or traditional fuels is predictable to be associated with 0.4 million deaths from acute symptoms of COPD⁴.

In Bangladesh the prevalence of COPD is 13.5% and more occurring aged 40 years or older. Illiteracy, smoking and biomass fuel burning are modifiable determinants of COPD. And also found higher among rural than urban residents and in males than females². Tobacco smoking is thought to be the main risk factor for developing COPD but other environmental exposures including biomass fuel exposure and air pollution may also contribute in developing COPD⁵. Diaphragmatic manipulation is an effective PNF technique helps in improving breathing pattern and respiratory muscle activity; The inter costal stretch enhances the chest wall elevation and increase chest expansion and diaphragm excursion to improve

intrathoracic lung volume which contributes to improvement in flow rate percentage.

2. Materials & Methods:

2.1 Study design: The study was conducted by using an Experimental Research design with two different groups. Only the experimental group received diaphragmatic manipulation along with conventional physiotherapy while in control group received only conventional physiotherapy treatment. This was the study of single blinded Experimental Research design and data collectors were blinding in this study.

2.2 Study place: The study was conducted during February 2017 to May 2017 at National Institute of diseases of chest & hospital (NIDCH), Mohakhali because there have a lot of COPD patients admitted there.

2.3 Ethics approval: The research proposal was submitted to the Institute Review Board (IRB) of BHPI for oral presentation. Then the IRB was approved the proposal. The permission from the concerned authorities obtained ensuring the safety of the participants. In order to eliminate ethical claims, the participants set free to receive treatment for other purposes as usual. Each participant informed about the study before beginning and given written research proposal was submitted to the Institutional Review consent.

2.4 Inclusion criteria: Age ranged from 40-70 years, with moderate stage of COPD³. No clinical evidence of obvious exercise limiting cardiovascular or neuromuscular diseases. All participants were not involved in previous rehabilitation program at least 4 months prior to the study and had no recent infectious

exacerbations for the 2 months preceding the study, with no history of psychiatry or psychological disorders. Initial medical screening was performed for each patient prior to the study³.

2.5 Exclusion criteria: Patients were excluded if they had significant or unstable cardiac, musculoskeletal or psychological problems or medication that could affect or interfere with their performance or affect their safe participation, any known abdominal pathologies, history of gastroesophageal reflux, any degree, persistent hiccups within previous three months, a history of serious injury to the spine or thorax, including costal or spinal fractures or history of diaphragm surgery, bronchial asthma or restrictive lung disease or receiving long-term oxygen therapy³.

2.6 Sample size: Thirty patients with COPD was selected randomly than 15 patients was randomly assigned to Diaphragmatic manipulation with conventional physiotherapy group and 15 patients to the only conventional physiotherapy group for this experimental research design. The samples were given numerical number C1, C2, C3 etc. for the control group and E1, E2, E3 etc. for experimental group.

2.7 Subjects: All participants were asked to continue their drug therapies, regular diet and normal daily activities throughout the study. Patients in experimental group received diaphragmatic manipulation along with conventional therapy and patients in control group received only conventional therapy.

2.8 Outcome measures:

Written questionnaire, spirometry, pulse oximeter

Interventions (Experimental group treatment protocols):

Treatment option	Duration/Repetition
Diaphragmatic manipulation	3 repetition in each session in one set
Deep breathing exercises	10 repetition in each session
Pulse lip breathing exercises	10 repetition in each session
Costal breathing exercise	10 repetition in each session
Spirometry exercise	5 minute in each session

Control group treatment protocols:

Treatment option	Duration/Repetition
Deep breathing exercises	10 repetition in each session
Purse lip breathing exercises	10 repetition in each session
Costal breathing exercise	10 repetition in each session

Spirometry exercise

5 minute in each session

3. Results:

Patient in the study were aged between 41 to 70 years old (the mean age in experimental group was 60 years whereas in control group 62 years). There were of 60% (n=18) male and 40% (n= 12) female.

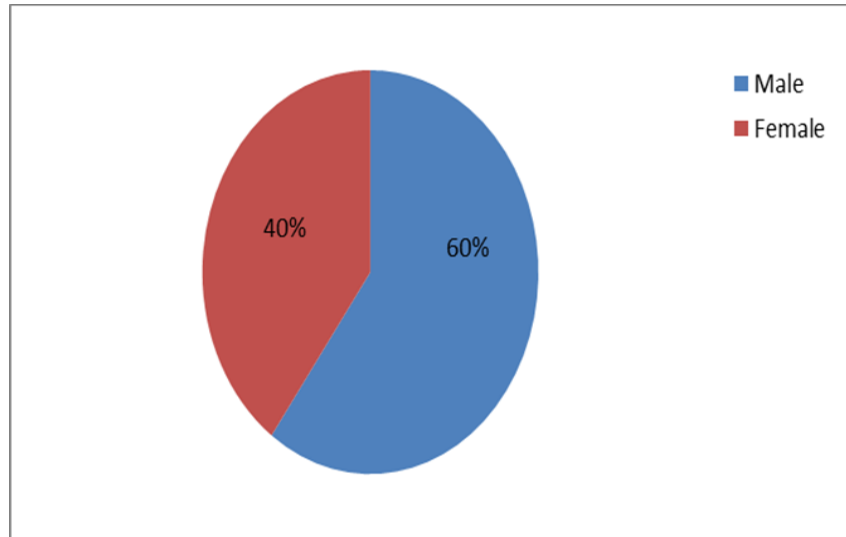


Fig-1: Gender of the Participants.

3.1 Occupation of the Participant:

3.1.1 Study showed that among the participants farmer were the highest rate that was about 40% (n=12). Businessman participants were second highest rate that was 37% (n=11). Serviceholder participants were 20% (n= 06) and house wife participants were 3% (n=1).

Occupation	Frequency	Percent
Farmer	12	40%
Businessman	11	37%
Service holder	6	20%
House Wife	1	3%

Table-1: Occupation of the Participants.

3.1.2 Educational Qualification: Study revealed that SSC passed participants were highest rate that was about 40% (n=12), Primary passed participant were second highest rate that was 33% (n=10), HSC passed; illiterate Participants were according to 23%, 3%.

3.1.3 Area: In this research it was estimated that people having COPD 70% (n=21) Patients were living at rural area and whereas 30% (n=09) patients were living at urban area.

3.2 Between Group Comparison of RR, PR, and SPO2 and after 6 min walk test measure pulse rate and oxygen saturation rate.

Among the thirty participants it was found that between group analysis diaphragmatic manipulation was effective for reduction of pulse rate because ($p=.005$), oxygen saturation rate ($p=.000$) and after 6 minute walk test reduction of oxygen saturation rate ($p=.000$)

Parameter	Pre mean	Post mean	t value	P value	Significant
Respiratory rate	29.30 ± 2.71	22.30 ± 3.05	1.093	.284	Not Significant
Pulse rate	103 ± 6	97.6 ± 5	3.044	.005	Significant
O2 saturation	92 ± 2	103 ± 4	7.34	.05	Significant
Pulse rate after 6 min walk test	119 ± 9	109 ± 8	7.34	.000	Significant
Oxygen saturation rate after 6 min walk test	88 ± 1	105 ± 5	.881	.386	Not Significant

Table-2: Between group comparison of respiratory parameter

Within Group Comparison through paired t test for variables of RR, PR, and SPO2 and after 6 min walk test measure pulse rate and oxygen saturation rate in statistically significance at the following level of significance

N	Variables	Experimental Group			Control Group		
		Observed "t" value	Observed "P" value	Significant/Not Significant	Observed "t" value	Observed "P" value	Significant/Not Significant
01	Respiratory rate	7.9	.00	Significant	10.20	.000	Significant
02	Pulse rate	7.8	.00	Significant	8.59	.000	Significant
03	O2 saturation	17.13	.00	Significant	.17	.08	Not Significant

04	Pulse rate after 6 min walk test	3.8	.002	Significant	11.36	.000	Significant
05	Oxygen saturation rate after 6 min walk test	5.19	.000	Significant	12.33	.000	Significant

Table-3: Within group comparison of respiratory parameters

In this way experimental group pulse rate ($p=.00$), oxygen saturation rate ($p=.00$), pulse rate in 6 minute walk test ($p=.002$), oxygen saturation rate in 6 min walk test ($p=.00$), it shows significant. It indicates that diaphragmatic manipulation along with conventional physiotherapy was effective for those variables. In comparison control group pulse rate ($p=.00$), oxygen saturation rate ($p=.08$), pulse rate in 6 minute walk test ($p=.002$), oxygen saturation rate in 6 min walk test ($p=.00$) was significant. It indicates that conventional physiotherapy was effective for those variables but only for oxygen saturation rate this treatment was not significant.

4. Discussion:

Study demonstrated that among thirty participants in both experimental and control group pulse rate, oxygen saturation rate and oxygen saturation rate after 6 minute walk test it was significant. It indicates that diaphragmatic manipulation along with conventional physiotherapy whether as only conventional physiotherapy had a great impact on reducing pulse rate and improving functional capacity in patients with moderate type of COPD.

5. Conclusion:

Functional outcomes of COPD patients may be limited by pulmonary, musculoskeletal constraints and low functional capacity. Diaphragmatic manipulation procedures yielded significant benefits

on both pulmonary function and functional capacity in patients with moderate COPD. Furthermore; results reported better responses of pulmonary function and functional capacity to combined application of both procedures. Furthermore, COPD is the world burden for disability.

6. References:

- Abdelaal AA, Ali MM, Hegazy IM. Effect of diaphragmatic and costal manipulation on pulmonary function and functional capacity in chronic obstructive pulmonary disease patients: Randomized controlled study. *International Journal of Medical Research & Health Sciences*. 2015 4(4): 841-847.
- Alam DS, Chowdhury MA, Siddiquee AT, Ahmed S, Clemens JD. Prevalence and Determinants of Chronic Obstructive Pulmonary Disease (COPD) in Bangladesh. *Journal of Chronic Obstructive Pulmonary Diseases*. 2015 12(6): 658-67.
- Ashraf A, Mohamed A, Ibrahim, H. Effect of Diaphragmatic and Costal Manipulation on Pulmonary function and Functional capacity In Chronic Obstructive Pulmonary Disease Patients: Randomized Control Trial Study. *International Journal of Medical Research and Health Science*, 2015 4(4): 841-847.
- Bhandari R, Sharma R. Epidemiology of chronic obstructive pulmonary disease: a descriptive study in the mid-western region of Nepal. *International Journal of Chronic Obstructive Pulmonary Disease*, 2012 7: 253-257

Global Initiative for Chronic Obstructive Lung Disease. Global Strategy for the Diagnosis, Management and Prevention of COPD. 2017 Website Available at <<http://goldcopd.org/gold-2017-global-strategy-diagnosis-management-prevention-copd/>>

Pauwels, P. R., Degenhardt, B. F., Johnson, J. C., & Burt, S. A. (2012). Immediate effects of osteopathic manipulative treatment in elderly patients with chronic obstructive pulmonary disease. *The Journal of the American Osteopathic Association*, 2012 108(5): 251-259.